1.0 SUMMARY

Monitoring and surveillance, on and around the Nevada Test Site, (NTS) by United States Department of Energy (DOE) contractors and NTS user organizations during 1999, indicated that operations on the NTS were conducted in compliance with applicable DOE, state, and federal regulations and guidelines. All discharges of radioactive liquids remained onsite in containment ponds, and there was no indication of potential migration of radioactivity to the offsite area through groundwater. During 1999, no accidental or unplanned releases occurred on the NTS. Oversite surveillance by the U.S. Environmental Protection Agency's Radiation and Indoor Environments National Laboratory (R&IE-LV) around the NTS indicated that airborne radioactivity from diffusion and evaporation of liquid effluents was not detectable offsite; however, low levels of airborne $^{239+240}$Pu were detected offsite by high-volume air samplers. Using the U.S. Environmental Protection Agency's (EPA's) Clean Air Package 1988 model (CAP88-PC) and NTS radionuclide emissions by the resuspension of soil and environmental monitoring data, the calculated effective dose equivalent (EDE) to the maximally exposed individual (MEI) offsite would have been 0.12 mrem. This value is 1.2 percent of the federal dose limit prescribed for radionuclide air emissions. The EDEs calculated from measured radioactivity concentrations by high-volume offsite air samplers were all less than the model prediction. The MEI receiving this dose would also have received an external exposure of 143 mrem from natural background radiation. A maximized estimate of the EDE to the MEI, from the inhalation of NTS airborne emissions and the ingestion of milk and of wild life, was calculated to be 0.63 mrem/yr (0.0063 mSv/yr), which is only 0.63 percent of the 100 mrem/yr dose limit to the general public. There were no nonradiological releases to the offsite area. Hazardous wastes were shipped offsite to approved disposal facilities. Compliance with the various regulations stemming from the National Environmental Policy Act (NEPA) is being achieved and, where mandated, permits for air and water effluents and waste management have been obtained from the appropriate agencies. Cooperation with other agencies has resulted in 12 different agreements, memoranda, and consent orders.

Biota Concentration Guides derived by the DOE Biota Dose Assessment Committee were used to determine that the radiation doses to terrestrial biota in all areas of the NTS are in compliance with a proposed DOE regulatory standard for biota. A determination of compliance with dose limits for aquatic biota was postponed until characterization of the radioactivity in the E Tunnel sediments is completed.

Support facilities at off-NTS locations have complied with the requirements of air quality permits and state or local wastewater discharge and hazardous waste permits as mandated for each location.

1.1 ENVIRONMENTAL MANAGEMENT

The DOE Nevada Operations Office (DOE/NV) is committed to increasing the quality of its management of NTS environmental resources. This has been promoted by the establishment of an Environment, Safety and Health Division (ESHD) under the purview of the Assistant Manager for Technical Services and by upgrading the Environmental Management activities to the Assistant Manager level to address those environmental issues that have arisen in the course of performing the original primary mission of the DOE/NV, i.e., underground testing of nuclear explosive devices. DOE/NV management has vigorously promoted the practice of pollution prevention, including waste minimization and material recycling.

Operational releases and seepage of radioactivity are reported soon after their occurrence. In compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP), as set forth in Title 40 Code of Federal Regulations Part 61, the accumulated annual emissions are used as part of the input to the EPA's CAP88-PC software program (DOE 1997c) to calculate potential EDEs to people living beyond the boundaries of the NTS and the surrounding exclusion areas.

1.2 RADIOLOGICAL ENVIRONMENT

Radiological effluents in the form of air emissions and liquid discharges are normally released into the environment as a routine part of operations on the NTS. Radioactivity in liquid discharges released to onsite waste treatment or disposal systems (containment ponds) is monitored to assess the efficacy of treatment and control and to provide an annual summary of released radioactivity. Air emissions are monitored for source characterization and operational safety as well as for environmental surveillance purposes.

Air emissions in 1999 consisted primarily of small amounts of tritium and plutonium that were assumed to be released to the atmosphere and were attributed to:

- Diffusion of tritiated water (HTO) vapor from evaporation of HTO from tunnel and characterization well containment ponds.
- Diffuse emissions calculated from the results of environmental surveillance activities.
- Resuspension of plutonium calculated by use of resuspension equations.

Diffuse emissions in 1999 included HTO, only slightly above detection limits, from the Radioactive Waste Management Site in Area 5 (RWMS-5), the SEDAN crater in Area 10, and the SCHOONER crater in Area 20 and resuspended $^{239+240}$Pu from areas on the NTS, where it was deposited by atmospheric nuclear tests or device safety tests in earlier years. Table 1.1 shows the quantities of radionuclides assumed to be released from all sources, including postulated loss of standards during laboratory operations. The radioactive materials listed in this table were not detected in the offsite area above ambient radioactivity levels. Onsite liquid discharges to containment ponds included approximately 25 Ci (0.92 TBq) of tritium. This was much less than the tritium discharge last year. Evaporation of this material could have contributed HTO to the atmosphere, but diffusion caused the concentration to be too small to be detected by the tritium monitors onsite. Most likely only the tritium emissions from SEDAN and SCHOONER sites were detected by air sampling. No liquid effluents were discharged to offsite areas.

ONSITE ENVIRONMENTAL SURVEILLANCE

Environmental surveillance on the NTS is designed to cover the entire area with some emphasis on areas of past nuclear testing and present operational activities. In 1999,

samplers were operated at 29 locations on and near the NTS to collect air particulate samples and at 12 locations to collect HTO in atmospheric moisture. Grab samples were collected frequently from water supply wells, water taps, containment ponds, and sewage lagoons. Thermoluminescent dosimeters (TLDs) were placed at 85 locations on the NTS to measure ambient gamma exposures.

Data from these networks are summarized as annual averages for each monitored location. Those locations with concentrations above the NTS average are assumed to reflect onsite emissions. These emissions arise from diffuse (areal) sources and from certain operational activities (e.g., radioactivity buried in the low-level radioactive waste [LLW] site).

Approximately 1,700 air samples were analyzed by gamma spectroscopy. All isotopes detected by gamma spectroscopy were naturally occurring in the environment (^{40}K, ^{7}Be, and members of the uranium and thorium series), except for a few instances where very low levels of ^{137}Cs were detected.

Gross beta analysis of the air samples yielded an annual average for the network of 2.1×10^{-14} µCi/mL (0.89 mBq/m^3). Plutonium analyses of monthly composited air filters indicated an annual arithmetic average of 1×10^{-16} µCi/mL (3.7 µBq/m^3) for $^{239+240}$Pu and 1.4×10^{-18} µCi/mL (0.052 µBq/m^3) of ^{238}Pu for all locations during 1999.

Slightly higher concentrations were found in samples from certain areas, but they were calculated to be only 0.02 percent of the Derived Air Concentration (DAC) for exposure to workers. Higher than background levels of plutonium are to be expected in some air samples because fallout from atmospheric tests in the 1950s, and nuclear safety tests in the 1950s and 1960s dispersed plutonium over a small portion of the NTS's surface.

Throughout the year atmospheric moisture was collected for two-week periods at 12 locations on the NTS and analyzed for HTO content. The annual arithmetic average of $(25 \pm 88) \times 10^{-6}$ pCi/mL (0.93 ± 3.3 Bq/m^3) was slightly higher than last year. The highest annual average concentrations were at the SCHOONER crater, the E Tunnel pond, and SEDAN crater in that order. The primary radioactive liquid discharge to the onsite environment in 1999 was about 25 Ci (0.92 TBq) of tritium (as HTO) in seepage from E Tunnel and from water pumped from wells into containment ponds. When calculating the dose for the offsite public, it was assumed that all of the HTO had evaporated.

Surface water sampling was conducted at one containment pond and nine sewage lagoon systems. A grab sample was taken from each of these surface water sites for analysis of gross beta, tritium, gamma-emitters, and plutonium isotopes. Strontium-90 was analyzed once per year for each location. Water samples from the lagoons contained background levels of gross beta, tritium, plutonium, and strontium. Samples collected from the tunnel containment pond and containment ponds for Underground Test Area (UGTA) characterization wells contained detectable levels of radioactivity, as would be expected.

Water samples from onsite supply wells and drinking water distribution systems were also analyzed for radionuclides. The supply well average gross beta activity of 6.5×10^{-9} µCi/mL (0.24 Bq/L) was 2 percent of the DCG for ^{40}K (used for comparison purposes); gross alpha was 5.5×10^{-9} µCi/mL (0.21 Bq/L), which was 37 percent of the drinking water standard; the concentrations of ^{3}H, ^{90}Sr, $^{239+240}$Pu, and ^{238}Pu were all below their respective minimum detectable levels of about 15×10^{-9} µCi/mL (0.56 Bq/L), 0.28×10^{-9} µCi/mL (10 mBq/L), and 2.5×10^{-11} µCi/mL (0.93 mBq/L).

Monitoring of the vadose zone beneath the waste management sites in Areas 3 and 5 revealed that wetting fronts extended only a few feet below the floor of these sites. Also, Resource Conservation and Recovery Act (RCRA) monitoring wells, for sampling

groundwater under RWMS-5, indicated that contamination from mixed waste buried therein is not detectable in the well samples.

Analysis of the TLD network showed that the 9 historic stations had an average annual exposure of 91 mR, while the 16 boundary stations (located at higher elevation) had a higher average annual exposure of 119 mR. Both exposures were consistent with previous data.

MONITORING SYSTEM DESIGN

During 1998, in an effort to make the environmental surveillance system on the NTS more efficient, it was redesigned. Using the Seven-Step Data Quality Objective (DQO) process, published by EPA, and information on the distribution and amount of radioactive sources on the NTS, a "Routine Radiological Environmental Monitoring Plan" (RREMP) was developed (DOE 1998a). As a result of the DQO process, some monitoring was eliminated in 1999. The number of air and TLD monitoring stations were reduced, and monitoring frequencies were also changed in 1999. The Plan was implemented in the latter part of 1998.

OFFSITE ENVIRONMENTAL SURVEILLANCE

The offsite radiological monitoring program is conducted around the NTS by the EPA's Radiation and Indoor Environments National Laboratory-Las Vegas (R&IE-LV), under an Interagency Agreement with DOE. This program consists of several environmental sampling, radiation detection, and dosimetry networks as described below. These networks operated continuously during 1999.

The Air Surveillance Network (ASN) was made up of 19 continuously operating sampling locations surrounding the NTS, 6 of which also had high-volume air samplers. During 1999, no airborne radioactivity related to current activities at the NTS was detected on any sample from low-volume ASN samplers. Other than naturally occurring ^{7}Be, the only specific radionuclide detected by this network was ^{238}Pu or $^{239+240}$Pu on air-filter samples from high volume air samplers. The network average gross beta in air results were slightly less than the average for the NTS network.

In 1999, external exposure was monitored by a network of 22 TLDs and 17 pressurized ion chambers (PICs) located in towns and communities around the NTS. The PIC network in the communities surrounding the NTS indicated background exposures, ranging from 72 to 152 mR/yr, that were consistent with previous data and well within the range of background data in other areas of the United States. The exposures measured by the TLDs were slightly less, as has been true in the past.

Sampling of Long-Term Hydrological Monitoring Program (LTHMP) wells and surface waters around the NTS showed only background radionuclide concentrations. The concentrations of radioactivity that were detected in air or water samples posed no significant health risk to nearby residents.

A network of 17 Community Technical Liaison Program (CTLP) stations was operated by local residents, one without an air sampler. Each station was an integral part of the ASN and TLD networks. In addition, they were equipped with a PIC connected to a gamma-rate recorder. Samples and data from these CTLP stations were analyzed and reported by R&IE-LV and also interpreted and reported by the Desert Research Institute, University of Nevada System. All measurements for 1999 were consistent with previous years and were within the normal background range for the United States.

Although no radioactivity attributable to current NTS operations was detected by any of the offsite monitoring networks, based on the NTS airborne releases reported in Table 1.1, an atmospheric dispersion model calculation (CAP88-PC) indicated that the maximum potential EDE to any offsite individual would have been 0.12 mrem (1.2×10^{-3} mSv) at Springdale, and the dose

to the population within 80 km of the several emission sites on the NTS would have been 0.38 person-rem (3.8×10^{-3} person-Sv), both of which were similar to last year. If one assumes that the MEI at Springdale also ate the meat of wild life which had migrated off the NTS after eating and drinking in radioactively contaminated areas, he could receive an additional EDE of 0.5 mrem/yr (0.005 mSv/yr). Assuming also that this individual ingested milk, an additional EDE from ^{90}Sr would be 0.010 mrem/yr (1.0×10^{-4} mSv/yr). These added to the air pathway EDE gives a total of 0.63 mrem/yr (0.0063 mSv/yr). For comparison, the hypothetical person receiving this dose would also have been exposed to 143 mrem/yr (1.43 mSv/yr) from natural background radiation. A summary of the potential EDEs due to operations at the NTS is presented in Table 1.2.

In compliance with the regulatory standard published by the DOE Biota Dose Assessment Committee, the dose to terrestrial biota was calculated for the most contaminated NTS areas. All such areas were in compliance with the Biota Concentration Guide.

OVERALL ASSESSMENT

Gross beta measurements in air samples are a reasonable method for assessing the radioactive environment at a location. In order to indicate the present situation at the NTS, in comparison with that of previous years, the network annual average gross beta concentrations in NTS air for the last 34 years are plotted in Figure 1.1. The obvious peaks in this trend line are identified with associated tests, where possible. Also plotted are data from the NTS offsite network operated by EPA, where it exists.

Figure 1.1 indicates the decrease with time of gross beta concentration in air that occurs independently of the peaks. In the early years, the decrease occurred because atmospheric tests and Plowshare cratering tests were terminated. In the later years, improved containment methods to reduce accidental releases led to the extremely low levels of radioactivity in air. Only tests in the atmosphere and nuclear accidents at foreign locations interrupt the steady decrease of gross beta concentration in NTS air.

LOW-LEVEL WASTE DISPOSAL

Environmental monitoring at the RWMS, Area 3 (RWMS-3) has detected plutonium in air samples. However, the upwind/ downwind sampler results were equivalent, and plutonium was detected in other air samples from Area 3, indicating that the source is resuspended plutonium from areas surrounding RWMS-3. Elevated levels of plutonium have been detected in air samples from several areas on the NTS where operational activities, vehicular traffic, and high winds resuspend plutonium for detection by air sampling. The presence of plutonium on the NTS is primarily due to atmospheric and safety tests conducted in the 1950s and 1960s. These tests spread plutonium on surface soil in the eastern and northwestern areas of the NTS (Figure 2.3, Chapter 2 displays these locations).

Environmental monitoring at and around RWMS-5 indicated that HTO in air was detectable at, but not beyond, the waste site boundaries. This monitoring included air sampling, water sampling, and external gamma exposure measurement. Vadose zone monitoring for water seepage is conducted beneath RWMS-3 and RWMS-5, as a method of detecting any downward migration of waste. Also, three monitoring wells, installed to satisfy RCRA requirements for a mixed-waste disposal operation at RWMS-5, have not yet detected any migration of hazardous materials.

RADIOLOGICAL MONITORING AT OFFSITE SUPPORT FACILITIES

Fence line monitoring, using Panasonic UD-814 TLDs, was conducted at DOE/NV offsite support facilities in North Las Vegas, Nevada; Santa Barbara, California; and at the Remote Sensing Laboratory-Andrews (RSL-Andrews). The 1999 results indicated that only background radiation was detected at the fence line of these facilities.

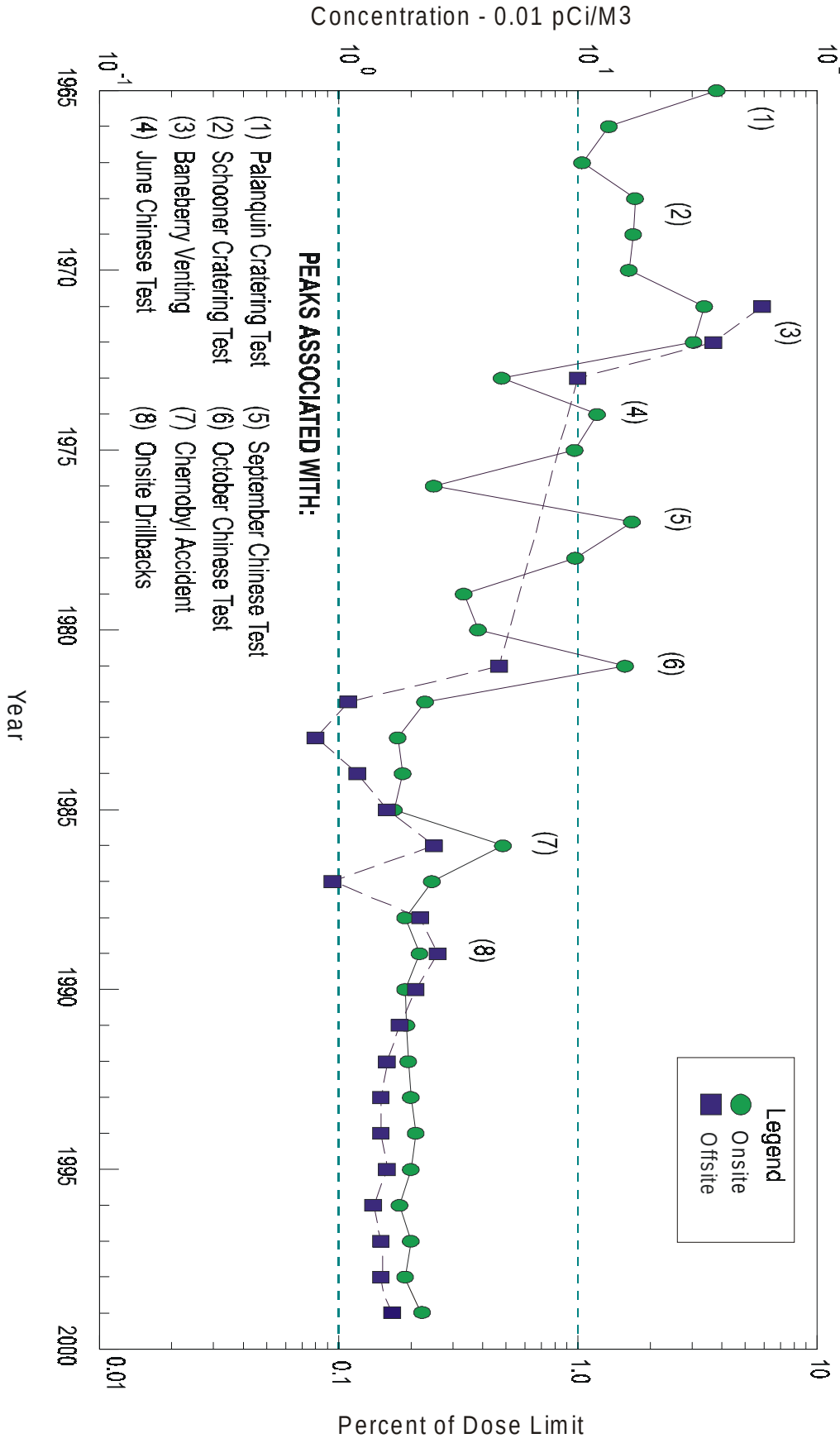

Figure 1.1 Trend of Gross Beta Concentration in Air at the NTS

In 1995, a small amount of tritium was accidently released from a calibration range building in North Las Vegas that was still detectable this year in the room where the release occurred. Monitoring of the release provided data for input into the CAP88-PC program for calculating offsite exposures. The maximum offsite exposure was estimated to be only 0.0014 mrem, which is far below the EPA permissible limit of 10 mrem.

1.3 NONRADIOLOGICAL MONITORING

Nonradiological environmental monitoring of NTS operations involved only onsite monitoring because there were no discharges of nonradiological hazardous materials to offsite areas. The primary environmental permit areas for the NTS were monitored to verify compliance with ambient air quality and the RCRA requirements. Air emissions sources common to the NTS included particulates from construction, aggregate production, surface disturbances, fugitive dust from unpaved roads, fuel burning equipment, open burning, and fuel storage facilities. NTS environmental permits active during 1999, which were issued by the state of Nevada or by federal agencies, included one comprehensive air quality permit covering emissions from construction of facilities, boilers, storage tanks, and surface disturbances; three onsite open-burn variances; one offsite permit for surface disturbance (environmental restoration activities); seven permits for onsite drinking water distribution systems; one permit for sewage discharges to lagoon collection systems; five permits for septage hauling; one incidental take permit for the threatened desert tortoise; and one permit for the scientific collection and study of various species on the NTS. Further, a RCRA permit has been obtained for general NTS operations and for two specific facilities on the NTS.

Permits at non-NTS operations included 12 air pollution control permits, 1 sewage discharge permit, and 2 hazardous material storage permits.

The only nonradiological air emission of regulatory concern under the Clean Air Act (CAA) has been due to asbestos removal during building renovation projects and from insulated piping at various locations on the NTS. During 1999, there were no projects that required state of Nevada notifications. The annual estimate for non-scheduled asbestos demolition/renovation projects for fiscal year 1999 was sent to EPA Region 9 in December 1998.

RCRA requirements were met through an operating permit for hazardous waste storage and explosives ordnance disposal. NTS operations also include mixed waste storage through a Consent Agreement between DOE and the state of Nevada.

The state's annual Compliance Evaluation Inspection during June 1999 found no violations.

As there are no liquid discharges to navigable waters, offsite surface water drainage systems, or publicly owned treatment works, no Clean Water Act (CWA) National Pollution Discharge Elimination System (NPDES) permits were required for NTS operations. Under the conditions of the state of Nevada operating permits, liquid discharges to onsite sewage lagoons are regularly tested for biochemical oxygen demand, pH, and total suspended solids. In addition to the state-required monitoring, these influents were also tested for RCRA related constituents as an internal initiative to further protect the NTS environment.

In June of 1999, the state inspected all NTS equipment regulated by the state air quality permit. There were no findings as a result of these inspections.

In compliance with the Safe Drinking Water Act (SDWA) and four drinking water supply system permits from the state, the onsite

distribution systems supplied by onsite wells are sampled either monthly or quarterly for coliform bacteria, depending on the status as a community or non-community system.

Monitoring for polychlorinated biphenyls, as required by the Toxic Substances Control Act (TSCA), was done and was reported to the DOE/NV in May 1999.

At the Hazardous Materials Spill Center (HSC), 8 projects involving many different chemicals and a stream fate study (Frostproof) were conducted during 1999. None of the tests generated enough airborne contaminants to be detected at the NTS boundary during or after the tests. Boundary monitoring would have been performed by R&IE-LV personnel if necessary. Based upon reviews of the spill test plans in accordance with the monitoring plan for the facility, no biota baseline monitoring was required.

1.4 COMPLIANCE ACTIVITIES

DOE/NV is required to comply with various environmental laws and regulations in the conduct of its operations. Monitoring activities required for compliance with the CAA, CWA, SDWA, TSCA, and RCRA are summarized above. Endangered Species Act activities include compliance with the United States Fish and Wildlife Service (USFWS) Biological Opinion on NTS Activities and the Biological Opinion on Fortymile Canyon Activities. NEPA activities included action on one Environmental Impact Statements (EISs), one Environmental Assessment (EA), and 12 Categorical Exclusions (CXs). A total of 35 other projects were excluded because they had been considered in the site-wide EIS or the Record of Decision.

Wastewater discharges at the NTS are not regulated under NPDES permits, because all such discharges are to onsite sewage lagoons. Discharges to these lagoons are permitted under the Nevada Water Pollution Control Act. Wastewater discharges from the non-NTS support facilities were within the regulated levels established by city or county publicly owned treatment works.

The American Indian Religious Freedom Act directs federal agencies to consult with Native Americans to protect their right to exercise their traditional religions. In 1999, work continued on a summary report, site records, and an artifact inventory of materials in the DOE/NV Curatorial Facility. Consultations with several Western Native American tribes were conducted to determine whether artifact collections should be repatriated.

The Ecological Monitoring and Compliance Program monitoring tasks, which were selected for 1999 included habitat mapping of the NTS, characterizing the natural wetlands on the NTS, conducting a census of the horse population, surveying bat species, surveying for raptors, and periodically monitoring man-made water sources to assess their effects on wildlife. Reviews of spill test plans for the HSC were also conducted.

Field surveys were conducted from June 1996 through February 1998 to identify those natural NTS springs, seeps, tanks, and playas, which could be designated by the United States Army Corps of Engineers as jurisdictional wetlands. During 1999, 18 of these wetlands were visited to characterize seasonal trends in physical and biological parameters.

The annual compliance report for calendar year 1999 NTS activities was prepared and submitted to the USFWS.

Pollution prevention activities conducted at the NTS and its offsite facilities involve active programs for recycling, material exchange, and waste minimization.

1.5 GROUNDWATER PROTECTION

The LTHMP was instituted in 1972 to be operated by the EPA under an Interagency Agreement. In 1999, the sampling of

surface and groundwaters on and around the NTS was transferred from the LTHMP to the RREMP. No radioactivity was detected above background levels in the groundwater sampling network surrounding the NTS. Low levels of tritium, in the form of HTO, were detected in onsite wells used only for monitoring purposes and not for drinking water.

Because wells that were drilled for water supply or exploratory purposes are used in the NTS monitoring program, rather than wells drilled specifically for groundwater monitoring, a program of well drilling for groundwater characterization at the NTS is underway. The design of the program is for installation or recompletion of groundwater characterization wells at strategic locations on and near the NTS. Through 1999, seven wells were completed, one offsite and six in the near offsite area, downgradient of the NTS.

Related activities included studies of groundwater transport of contaminants (radionuclide migration studies) and nonradiological monitoring for water quality assessment and RCRA requirements.

1.6 RADIOACTIVE AND MIXED WASTE STORAGE AND DISPOSAL

Two RWMSs are operated on the NTS: one each in Areas 3 and 5. During 1999, the RWMSs received LLW generated at the NTS and other DOE facilities. Waste is disposed of in shallow pits and trenches in RWMS-5 and in subsidence craters in RWMS-3.

At RWMS-5, LLW is disposed of in standard packages. Transuranic (TRU) and TRU mixed wastes are stored on a curbed asphalt pad on pallets in overpacked 55-gal drums and steel boxes. These will be characterized prior to shipment to the Waste Isolation Pilot Plant in New Mexico. The RWMS-3 is used for disposal of bulk LLW waste and LLW that is packaged, including packages that are larger than the specified standard size used at RWMS-5.

Environmental monitoring at both sites included air sampling for radioactive particulates and measurement of external exposure using TLDs. Water sampling and vadose zone monitoring for moisture and hazardous constituents are conducted at the RWMS-5, as is monitoring for tritium in atmospheric moisture. Environmental monitoring results for 1999 indicated that measurable radioactivity from waste disposal operations was detectable only in the immediate vicinity of the facilities.

Because the NTS is not a RCRA-permitted disposal facility, RCRA regulations require the shipment of nonradioactive hazardous waste to licensed disposal facilities offsite. Therefore hazardous waste is not disposed of onsite.

Pit 3 in RWMS-5 has interim status for mixed waste generated on the NTS.

LLW is accepted for disposal only from generators (onsite and offsite) that have submitted a waste application that meets the requirements of the Waste Acceptance Criteria document (NTS 1996) and that have received DOE/NV approval of the waste stream(s) for disposal at the NTS.

1.7 QUALITY ASSURANCE

The quality assurance (QA) program covering NTS activities has three components. There are QA programs for nonradiological analyses, onsite radiological analyses, and offsite radiological analyses.

ONSITE NONRADIOLOGICAL QUALITY ASSURANCE

The onsite nonradiological QA program was not operative during 1999, because stable chemical analyses are done by offsite

contract laboratories. These contract laboratories are monitored for their participation and performance in various performance evaluation programs.

ONSITE RADIOLOGICAL QUALITY ASSURANCE

The onsite radiological QA program includes conformance to best laboratory practice and implementation of the provisions of DOE Order O 414.1A (DOE 1999). The external QA intercomparison program for radiological data QA consists of participation in the DOE Quality Assessment Program administered by the DOE Environmental Measurements Laboratory (EML), in the InterLaB Rad CheM™ Proficiency Testing Program by Environmental Resource Associates, and in the Radiochemistry Intercomparison Program provided by the National Institute of Standards and Technology.

OFFSITE RADIOLOGICAL QUALITY ASSURANCE

The policy of the EPA requires participation in a centrally managed QA program by all EPA organizational units involved in environmental data collection. The external QA programs used by the R&IE-LV for the NTS Offsite Radiological Safety Program during 1999 consisted of the DOE Quality Assessment Program administered by the DOE EML and the Mixed Analyte Performance Evaluation Program (MAPEP) conducted by the Idaho National Engineering and Environmental Laboratory.

1.8 ISSUES AND ACCOMPLISHMENTS

PRINCIPAL COMPLIANCE PROBLEMS FOR 1999

- Lead was found above the SDWA action level in the Area 1 and Area 2-12 drinking water systems. All fixtures were removed or closed in the Area 1 system and no further lead sampling will take place unless the buildings are reopened. The problem in the Area 2-12 system is still being resolved.

ACCOMPLISHMENTS FOR 1999

- Implementation of the RREMP. The RREMP uses a DQO approach to identify the environmental data that must be collected for regulatory compliance and provides QA, Analysis and Sampling Plans to ensure that defensible data are generated. The RREMP provides one common integrated approach for all routine environmental monitoring both on and off the NTS. Other facilities also included in the RREMP are the associated DOE facilities at the North Las Vegas Facility (NLVF), the Remote Sensing Laboratory - Nellis (RSL-Nellis), the Los Alamos Operations, the Special Technologies Laboratory (STL), and the RSL-Andrews.

- The Bechtel Environmental Integrated Data Management System (BEIDMS), Oracle relational database, replaced the Laboratory Data Analysis System (LDAS) for the storage, documentation and retrieval for all environmental sampling results. BEIDMS integrates the preparation of chain-of-custody, sample labeling, QA, data verification/validation, and user-friendly querying in one system providing greater assurance that the data are defensible.

- NEPA Environmental Evaluation Checklists were completed for 60 proposed projects.

- Throughout 1999, DOE/NV continued to maintain and update the “DOE/NV Compliance Guide” (Volume III), a handbook containing procedures, formats, and guidelines for personnel responsible for NEPA compliance activities.

In 1999, the following accomplishments were achieved in the management of cultural resources at the NTS:

- Six cultural resources and seven archaeological sites were located and recorded. One of these sites, Camp Desert Rock, is considered a candidate for listing on the National Register of Historic Places.
- The NRHP approved the relocation of the train engine housed in the E-MAD facility in Area 25 to the train museum in Boulder City.
- A technical report on the archaeological data recovery program for the proposed Kistler Rocket Launch Facility was included in Nevada's Cultural Resources archives.
- The archaeological research on 2,900 petroglyph images from about 700 boulders, was documented in a report draft scheduled for completion in 2000.
- The Cultural Resources Management Plan for the NTS was completed and distributed.
- An annual report summarizing the curation compliance activities of Desert Research Institute was completed.
- A report was completed which summarized the recommendations of the Consolidated Group of Tribal Organizations in regard to the repatriation of selected artifacts from recent collections from the NTS.
- A survey was completed identifying 150 historic atmospheric nuclear testing remains in Frenchman Flat.
- DOE/NV sponsored a meeting with the Consolidated Group of Tribal Organizations to determine whether three small collections of Native American artifacts should be repatriated.
- Operations conducted under the Nevada Operations Site Pollution Prevention Program in 1999 resulted in recycle or new uses of nearly 1,169 metric tons of materials and approximately 107 metric tons of hazardous waste made useful (waste reduction).
- Continued use of a Just-in-Time supply system allowed NTS contractors to reduce product stock and control potentially hazardous products.
- Progress continued on the NTS groundwater characterization program by use of pumping programs on several wells to estimate yields and radionuclide content.
- Habitat maps of vegetation alliances on the NTS were completed to identify groups of visually similar vegetation, soils, slope, and hydrology which may warrant active protection from DOE projects.
- Monitoring of 26 sensitive species of vegetation and animals (Western Burrowing Owl, bats, and raptors) was begun to ensure their continued presence on the NTS by protecting them from impacts of DOE projects and to determine if further protection under State and Federal laws is necessary.
- The state issued a RCRA Research, Development, and Demonstration Permit for the construction and operation of a facility to develop treatment methods for demilitarizing rocket motors.
- DOE/NV has entered in 12 agreements, memoranda, and consent orders with other entities, including an Interagency Agreement and Memorandum of Understanding (MOU) with EPA regarding environmental surveillance and NESHAP compliance; Agreements in Principle with Alaska, Mississippi, and Nevada on environment, safety, and health oversight activities; a MOU with

Nevada covering radioactive releases; a MOU with Nellis Air Force Base regarding environmental restoration; a Settlement Agreement with Nevada on handling mixed TRU waste; a FFACO with Nevada on environmental restoration; and a Federal Facilities Compliance Act Consent Order regarding restricted waste streams on the NTS.

- The first annual consumer confidence report containing details on the two NTS community drinking water systems were issued in 1999.

1.9 CONCLUSION

The environmental monitoring results presented in this report document that operational activities on the NTS in 1999 were conducted so that no measurable radiological exposure occurred to the public in offsite areas. Calculation of the highest individual dose that could have been received by an offsite resident (based on estimation of onsite worst-case radioactive releases obtained by measurement or engineering calculation and assuming the person remained outdoors all year) equated to 0.12 mrem to a person living in Springdale, Nevada. This may be compared to that individual's exposure to 143 mrem from natural background radiation as measured by the PIC instrument at Beatty, Nevada.

There were no major incidents of nonradiological contaminant releases to the environment in 1999. Many contaminated sites are on schedule for remediation, and intensive efforts to characterize and protect the NTS environment, implemented in 1990, were continued in 1999.

The UGTA program and other activities devoted to characterization and protection of groundwater on and around the NTS continued on schedule.

Table 1.1 Radionuclide Emissions on the NTS - 1999[a]

Radionuclide	Half-life (years)	Quantity Released (Ci)[b]
Airborne Releases:		
^{3}H	12.35	338[c]
$^{239+240}Pu$	24065.[e]	0.24 [c]
Containment Ponds:		
^{3}H	12.35	24.7 [d]
^{238}Pu	87.743	5.5×10^{-6}
$^{239+240}Pu$	24065.[e]	4.8×10^{-5}
^{90}Sr	29.	3.2×10^{-5}
^{137}Cs	30.17	4.1×10^{-3}

(a) Assumes worst-case point and diffuse source releases; there were no unplanned releases .
(b) Multiply by 37 to obtain GBq.
(c) Includes calculated data from air sampling results, postulated loss of laboratory standards, and calculated resuspension of surface deposits.
(d) This amount is assumed to evaporate to become an airborne release.
(e) This is the halflife of ^{239}Pu.

Table 1.2 NTS Radiological Dose Reporting Table for Calendar Year 1999

Pathway	Dose to MEI (mrem)	Dose to MEI (mSv)	Percent of DOE 100-mrem Limit	Estimated Population Dose (person-rem)	Estimated Population Dose (person-Sv)	Population within 80 km	Estimated Natural Population Dose (person-rem)
Air+Milk+ Wild Life[a]	0.63	0.0063	0.63	0.38	0.0038	36,517	3,520
Air only	0.12	0.0012	1.2[b]	0.38	0.0038	36,517	3,520

(a) EDE of 0.50 mrem from wild life was based upon measurements of radionuclides in water, vegetation, and rabbit tissue samples collected at E Tunnel pond and CAMBRIC ditch. The MEI was assumed to harvest state bag limits for three types of wild game (doves, rabbits, and deer). EDE from ingestion of milk was 0.010 mrem/yr.

(b) Limit for Air pathway is 10 mrem.

View of Mercury, the Main Base Camp at the NTS